

Wind Turbine

From ancient times until now, mankind has been using wind. For centuries, wind mills have been used to convert wind energy to useful mechanical power to pump water or grind grain. The kinetic energy in the wind is also used to fly kites and to sail the seas and oceans.

Wind power is a renewable source of energy that is actually driven by the sun. The sun produces nonuniform warming of the uneven earth's surface, and the earth's rotation about its axis creates wind.

Wind turbines convert wind energy into a useful, flexible, and valuable form of energy, namely electricity. Through gridlines, the electricity can be transferred to long distances to serve the needs of the inner cities and rural populations. This energy can also be stored in batteries, or it can be used in the electrolyzer to split water to hydrogen and oxygen. When the mass production of fuel cell cars hits the market, hydrogen produced from wind sources will be a prospective energy carrier for

transportation.

A real wind turbine consists of a rotor, a shaft, and a gear box. The rotor is an assembly of two or three blades. The rotor is connected to a slow rotating shaft that enters the gear box. The gear box output is a fast rotating shaft that enters the generator to convert kinetic energy to electricity.

In Solar House and Green Utility House products, the blade is designed similar to a wind turbine. When wind pushes the wind turbine blade, the shaft of the electric motor (5) rotates. The electric motor acts as a generator and converts the kinetic energy of wind to electricity. The generated electricity will supply the ceiling fan (4).

The generator is similar to the electric motor but its function is opposite, i.e. it converts mechanical energy (movement) to electricity.



Electric Motor

Many of the machines that we use everyday are powered by an electric motor. In a fan, an electric motor uses electricity to rotate the blades and creates wind. Such a motor converts electricity into mechanical energy.

In H&FC educational kit products, electric motor converts electric energy produced by the fuel cell to mechanical energy which moves the blade. The basic components of an electric motor are (Figure 7):

1. Permanent Magnet
2. Coil
3. Brush
4. Commutator

In a simple electric motor like this, direct current produced by a fuel cell is fed through carbon rods called brushes into a coil that sits between the north and south poles of a permanent magnet. The wire carrying a current produces a magnetic field and detects a force in another magnetic field forcing the coil to turn. To maintain the rotation, the current is reversed every half-turn by an attachment called a commutator. The continuous turning motion of the coil drives the motor.

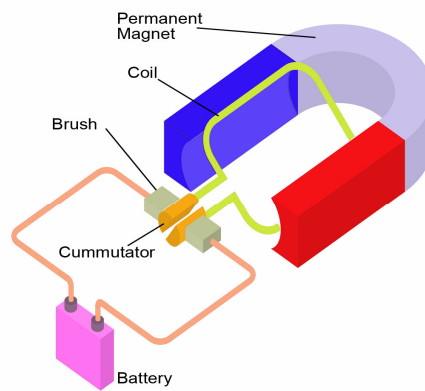


Figure 7 – Electric Motor